

Personality Assessment Inventory (PAI) Profiles of Male Veterans With Combat-Related Posttraumatic Stress Disorder

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Accepted July 14, 2004

The Personality Assessment Inventory (PAI; L. C. Morey, 1991) is a promising tool for the assessment of Posttraumatic Stress Disorder (PTSD), but few studies have examined the PAI profiles of individuals with the diagnosis. In this study, the PAI was administered to 176 combat veterans with PTSD. Results showed significant elevations on scales measuring depression, somatic complaints, anxiety, anxiety-related disorders, schizophrenia, and negative impression management. The Traumatic Stress subscale was the highest point in the mean score profile and was moderately correlated with several established measures of PTSD. Veterans with and without comorbid major depression differed on PAI scales assessing depression, anxiety, and warmth. Analysis of two-point codetypes for the PAI and the MMPI-2 revealed substantial heterogeneity in symptom endorsement on both instruments, suggesting that there may be no clear "PTSD profile" on either instrument. Results provide a reference point for future work with the PAI in PTSD samples.

KEY WORDS: PTSD; Personality Assessment Inventory; assessment; trauma; veterans.

The Personality Assessment Inventory (PAI; Morey, 1991) is a multiscale psychopathology assessment instrument designed to assess a broad array of diagnostic constructs important to current theory and practice in clinical psychology. It features nonoverlapping scales, four response alternatives, a fourth-grade reading level, and scale names that have straightforward associations with scale content. The PAI has grown in popularity in recent years (Belter & Piotrowski, 2001; Piotrowski, 2000) with considerable evidence for its reliability and validity accumulating during that time (Alterman et al., 1995; Ban, Fjertland, Kutcher, & Morey, 1993; Boone,

1998; Boyle & Lennon, 1994; Costa & McCrae, 1992; Morey, 1991; Rogers, Flores, Ustad, & Sewell, 1995; Schinka, 1995). However, relatively little attention has been devoted to evaluating the utility of the PAI for the assessment of Posttraumatic Stress Disorder (PTSD). Prior studies that have addressed this issue have shown that individuals with PTSD produce significant elevations (i.e., *T* scores >70) on PAI scales measuring depression and anxiety-related disorders, somatic complaints, social detachment, thought disorder, and negative relationships (Holmes, Williams, & Haines, 2001; Liljequist, Kinder, & Schinka, 1998). However, only Morey (1996) has reported a full mean profile for all scales and subscales, and these studies were limited by small samples (*N*'s = 24–54). Therefore, a primary objective of this study was to examine PAI profiles in a larger sample of individuals with PTSD.

A second objective of this study was to examine the psychometric properties of the PAI Traumatic Stress subscale. The scale is composed of items assessing re-experiencing, feelings of being changed for the worse,

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and avoidance, but little is known about its psychometric properties and only one prior study has reported group means for a PTSD-diagnosed sample (Morey, 1996). In this study, the convergent validity of the PAI Traumatic Stress scale was assessed by examining its relationship to established measures of PTSD.

A noteworthy benefit of comprehensive multiscale inventories like the PAI is that they permit examination of diagnostic complications inherent to the assessment and treatment of PTSD, including the high rates of psychiatric comorbidity (cf. Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). In this study, comorbid Major Depression was systematically assessed in all participants, which provided an opportunity to examine, for the first time, the ability of the PAI to detect the presence of comorbid major depression in a PTSD sample. A similar study using the MMPI-2 found differences in the severity of reported symptoms, but no differences in the basic symptom profile between PTSD groups with different comorbid mood and anxiety disorders (Weyermann, Norris, & Hyer, 1996). These findings suggest that the PAI profiles of PTSD-diagnosed veterans with and without comorbid depression may only differ in profile elevation. However, Morey (1996) has suggested that there are specific PAI scales and subscales that have a unique association with Major Depressive Disorder, namely the Depression and Suicidal Ideation scales and the Mania-Grandiosity subscale. Comparing the score profiles of veterans with and without comorbid Major Depression in the present study will reveal any group differences in these scales.

In addition to examining overall scale elevations, a common method for characterizing profiles on multiscale inventories is to identify two-point codetypes, (i.e., the two scales with the highest elevation above an established clinical cut-off). Based on earlier research with the MMPI in PTSD populations, some investigators have suggested that the 2-8/8-2 (Depression and Schizophrenia) profile is a prototypical "trauma profile" (Wilson & Walker, 1990). Studies reporting MMPI-2 mean profiles in PTSD samples have shown mean two-point codetypes containing scales 8 and 7 (Psychasthenia), or scales 8 and 2 (Albrecht et al., 1994; Litz et al., 1991; Munley, Bains, Bloem, & Busby, 1995). However, several investigators have also reported considerable heterogeneity in the MMPI-2 profiles of PTSD patients (Glenn et al., 2002; Munley, Bains, & Bloem, 1993; Munley, Bains, Bloem, & Busby, 1995; Wise, 1996). No prior study has quantified the degree of code-type heterogeneity on both the MMPI-2 and the PAI in the same PTSD sample.

A final strength of the PAI for the assessment of PTSD is its ability to assess response style. Secondary

gain frequently becomes an issue in the context of PTSD evaluation. In particular, assessments of veterans in VA PTSD clinics are often performed in the context of a disability compensation evaluation, and compensation-seeking status has been shown to influence symptom overreporting in this population (cf. Frueh et al., 2003). The PAI includes indices that assess response inconsistency, infrequency, negative impression management, positive impression management, and malingering. Two prior studies have examined malingering of PTSD using the PAI, and both offered recommendations for cutoff scores for the Malingering Index (MAL) and the Negative Impression Management scale (NIM) to detect the malingering of PTSD (Calhoun, Earnst, Tucker, Kirby, & Beckham, 2000; Liljequist et al., 1998). These cutoff scores, while providing adequate sensitivity, demonstrated poor specificity (Calhoun et al., 2000). Rogers and colleagues (Rogers, Sewell, Morey, & Ustad, 1996) have also developed a multiscale discriminant function to assess malingering on the PAI that has been found to be superior to MAL and NIM in discriminating simulators from psychiatric patients (Bagby, Nicholson, Bacchocchi, Ryder, & Bury, 2002). However, no published studies have examined its performance in a PTSD sample. Therefore a final aim of this study was to determine the proportion of profiles of veterans evaluated in a VA PTSD clinic that would be identified as invalid using these cutoffs.

To summarize, the primary objectives of this study were to: (1) provide descriptive information about the PAI profiles of a carefully-diagnosed, large sample of male veterans with PTSD, including a comparison of those with and without comorbid Major Depression; (2) examine the sensitivity and the construct validity of the PAI Traumatic Stress subscale with other established measures of PTSD and trauma exposure; (3) compare mean profiles and codetype frequencies for the PAI and MMPI-2 in the same sample; and (4) examine the proportion of profiles identified as invalid in a veteran sample using recommended cutoffs for the Malingering Index, the Negative Impression Management scale, and the Rogers et al. (1996) discriminant function for detecting feigned mental disorder.

METHOD

Participants

Analyses were based on data drawn from an archival database of psychological evaluations of male combat-exposed veterans seen in an outpatient PTSD Clinic of a

Department of Veterans Affairs Medical Center (VAMC) from January 1999 to August 2002. During this interval, 659 veterans were assessed. From this group, all veterans who had completed the MMPI-2, PAI, and a diagnostic interview were selected for analyses ($N = 230$). The lack of PAI data resulted in the majority of cases eliminated (352 cases). The base rate for PTSD is high in this sample, as is typical for VAMC PTSD clinics. Because only 20 veterans of the 230 were not diagnosed with PTSD, and thus did not provide an adequate comparison group, they were eliminated from further analyses.⁶ All 210 veterans in the resulting sample (a) reported exposure to a combat-related traumatic experience meeting Criterion A for the DSM-IV PTSD diagnosis (APA, 1994), (b) produced scores greater than zero on the Combat Exposure Scale (Keane et al., 1989), and (c) were diagnosed with combat-related PTSD on the basis of administration of the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995).

Following guidelines provided by Morey (1996) in the PAI interpretive guide, profiles with validity indices exceeding any of the following criteria were identified as invalid: Infrequency Scale (INF) $\geq 75T$, Inconsistency Scale (ICN) $\geq 73T$, Negative Impression Management (NIM) $\geq 110T$, or a Malingering Index (MAL) score ≥ 5 . Application of this rule resulted in the exclusion of 34 (16.2%) cases from all further analyses,⁷ and a final sample of 176. No significant differences in age, race, years of education, marital status, or Hollingshead Index for socioeconomic status (Hollingshead & Redlich, 1958) were found between the original sample and those who were excluded.

Seventy-seven percent of the sample were veterans of the Vietnam War, 12% were Gulf War veterans, 4% were Korea or World War II veterans, and the remainder served in areas of military conflict between these wars. The mean age of the sample was 52 (range: 25–78). Fifty-three percent of the sample was African American, 43% Caucasian, and the remaining veterans were of other racial background. Fifty-seven percent of the sample was married, 32% divorced or separated, 10% never married, and 1% widowed. Nine percent had less than a high school

education, 41% completed only high school, 36% completed some college, and 14% obtained a college degree. The mean Hollingshead Index for the sample was 56.0 ($SD = 11.3$), which falls in the lower middle class category of socioeconomic status.

Full assessment of comorbid disorders was not routinely included in the clinic evaluations due to time and staff limitations. However, data from administration of the Major Depression module of the Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Williams, & Gibbon, 2000) was available for 95% of the sample (167 cases). Of those, 122 (73%) met criteria for current comorbid Major Depression. Clinic policy dictated that veterans with current substance abuse or dependence were referred to substance use treatment and were required to be in at least early full remission before participating in PTSD evaluation. Therefore, few veterans in the PTSD clinic database met criteria for a current substance use disorder at the time of evaluation.

Veterans in the study were predominantly compensation-seeking at the time of the evaluation. Forty-nine percent of the sample reported that they had already applied, and 42% reported that they were planning to apply for VA service-connection for PTSD. Two veterans were already service-connected for PTSD, two were service-connected for other psychiatric conditions, and 50% were service-connected for nonpsychiatric medical conditions.

Measures

Personality Assessment Inventory (PAI; Morey, 1991)

The PAI is a 344-item, multiscale self-report measure of personality, psychopathology, and current functioning. Norms have been published, and the PAI has been shown to compare favorably with other major personality inventories in terms of reliability indices, with a median alpha of .86 for the full scales in clinical samples (Morey, 1991; 1996). The four validity scales assess Inconsistency (ICN), Infrequency (INF), Negative Impression Management (NIM), and Positive Impression Management (PIM). The 11 clinical scales assess Somatic Complaints (SOM), Anxiety (ANX), Anxiety-Related Disorder (ARD), Depression (DEP), Mania (MAN), Paranoia (PAR), Schizophrenia (SCZ), Borderline Features (BOR), Antisocial Features (ANT), Alcohol Problems (ALC), and Drug Problems (DRG). There are five treatment consideration scales (Aggression [AGG], Suicidal Ideation [SUI], Stress [STR], Nonsupport [NON], and Treatment Rejection [RXR]), and two interpersonal scales, (Dominance [DOM] and Warmth [WRM]).

⁶Although not large enough to provide an adequate comparison group, mean PAI scores were also calculated for the 20 veterans who were not diagnosed with PTSD. No scales in the mean profile for this group were elevated above 70T.

⁷PAI, rather than MMPI-2 validity scales were used to identify and remove profiles likely to be invalid because the PAI was the focus of analyses in this study. The exclusion of 16% of profiles, though high, is not unusual in combat veteran PTSD samples when MMPI-2 validity indices are used (cf., Freuh, Hammer, Cahill, Gold, & Hamlin, 2000).

Minnesota Multiphasic Personality Inventory-2 (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 2001)

MMPI-2 analyses focused on the three validity scales (L, F, and K), the two PTSD supplementary scales (PTSD-Keane [PK] and PTSD-Schlenger [PS]) and the nine Clinical scales including Hypochondriasis (1), Depression (2), Hysteria (3), Psychopathic-Deviate (4), Paranoia (6), Psychasthenia (7), Schizophrenia (8), Mania (9), Social Introversion (0).

Combat Exposure Scale (CES; Keane et al., 1989)

The CES is a 7-item scale designed to assess the intensity, frequency, and duration of traditional combat experiences involving threat of danger, loss of life, or severe physical injury. Scores range from 0 to 41, with scores of 0–8 indicating light combat, 9–16 light-moderate, 17–24 moderate, 25–32 moderate-heavy, and 33–41 heavy combat.

Mississippi Scale for Combat-Related PTSD (Keane, Caddell, & Taylor, 1988)

The Mississippi Scale is a screening and diagnostic measure of combat-related PTSD, and has been shown to be reliable and valid in treatment-seeking samples (Keane, Wolfe, & Taylor, 1987). A cutoff score of 107 has been suggested by the scale authors as the optimal cutoff for discriminating Vietnam veterans with and without combat-related PTSD.

Davidson Trauma Scale (DTS; Davidson, 1996; Davidson et al., 1997)

The DTS is composed of 17 items corresponding to each of the 17 DSM-IV symptoms of PTSD. Items 1–4 and 17 represent criterion B (intrusive re-experiencing), items 5–11 represent criterion C (avoidance and numbing of emotional experience), and items 12–16 represent criterion D (hyperarousal). For each item, the respondents rate both frequency and severity of symptoms during the previous week on 5-point scales, for a possible total score of 136 points.

Beck Depression Inventory (BDI)

The BDI is a 21-item, forced-choice measure of general depression severity that has been found to yield

reliable and valid scores (Beck & Steer, 1987; Beck, Steer, & Garbin, 1988).

Procedure

Veterans were assessed over three sessions. During session one, they were administered a battery of paper-and-pencil questionnaires including demographic, social, and military information along with the Combat Exposure Scale, the Davidson Trauma Scale, and the Mississippi Scale. During session two, they completed the MMPI-2 and the PAI on computer, and during the third session, the CAPS was administered. PTSD symptoms were considered present if they were reported as occurring at least once in the past month with a severity rating of at least “2” (defined as “moderate, definitely present,” and producing “some disruption of activities”). Participants endorsing the requisite number of symptoms according to the DSM-IV were diagnosed with PTSD.⁸ Clinicians were a Masters-level technician, clinical psychology interns, and postdoctoral fellows working under the supervision of a licensed clinical psychologist. All clinicians were trained in CAPS administration and were required to demonstrate proficiency in rating five videotaped CAPS administrations. The mean kappa coefficient for PTSD diagnostic determinations during the study period was .90. (This included diagnosis of clinic patients as well as videotaped research participants).

RESULTS

Combat Exposure and PTSD Symptoms

Mean scores on measures of combat exposure and PTSD are presented in Table I. The mean total score on the CES indicated a moderate level of combat exposure. Mean scores on the Mississippi Scale–Combat Version, the DTS, the MMPI-2 PK scale, and the MMPI-2 PS scale were consistent with diagnosis of combat-related PTSD.

Sensitivity and Validity of the Traumatic Stress Subscale

The mean traumatic stress subscale score was 847 ($SD = 13.2$). This was the highest mean subscale score

⁸CAPS total scores are not available for the full sample because time limitations in some cases required that only the minimum number of CAPS items needed to determine diagnosis were administered.

Table I. Means, Standard Deviations, and Correlations of Combat-Exposure and PTSD Measures With PAI Anxiety-Related Disorders Scale and Its Traumatic Stress Subscale

Scale	Mean	SD	PAI Measure	
			ARD	ARD-T
CES	21.6	11.6	.14	.19*
MISS	119.2	17.7	.62**	.67**
PK	91.2	13.2	.63**	.58**
PS	92.1	13.3	.66**	.58**
DTS	99.1	23.7	.53**	.44**

Note. ARD = PAI Anxiety Related Disorders full scale, ARD-T = Anxiety Related Disorders-Traumatic Stress subscale, CES = Combat Exposure Scale, MISS = Mississippi Scale for Combat-Related PTSD, PK = MMPI-2 PTSD-Keane supplementary scale, PS = MMPI-2 PTSD-Schlinger supplementary scale, DTS = Davidson Trauma Scale.

* $p < .05$. ** $p < .01$.

for the sample and was 6.3 points above the next highest subscale. One hundred forty-three (81.2%) veterans scored above 70T, 113 (64.2%) scored above 80T, and 69 (39.2%) scored above 90T on this scale. The traumatic stress subscale showed significant correlations with the CES, MMPI-2 PK and PS scales, the Mississippi Scale, and the DTS total score (see Table I). The Anxiety-Related Disorders full scale was also correlated with the measures of PTSD, but not with the CES.

PAI Mean Scale Profile

The PAI full scale mean profile is shown in Fig. 1, with values for all scale and subscale means and standard deviations shown in Tables II and III. It is characterized by significant elevations ($>70T$) on the Negative Impression Management, Somatic Complaints, Anxiety, Anxiety-Related Disorders, Depression, and Schizophrenia scales. On the clinical subscales, elevations above 70T were observed on scales assessing traumatic stress; somatic conversion; cognitive, affective and physiological symptoms of depression; affective and physiological anxiety symptoms; social detachment; thought disorder; physical aggression; health concerns; somatization; and affective instability (see Table II).

Comparison of Veterans With and Without Comorbid Depression

Veterans meeting criteria for comorbid Major Depressive Disorder (MDD; $n = 122$) did not differ from veterans who did not meet current MDD criteria in terms of age, education, SES, combat exposure, or Mississippi Scale scores. However, as expected, they did

score significantly higher on the Beck Depression Inventory (MDD $M = 29.6$, Non-MDD $M = 24.8$, $F = 7.4$, $p < .01$). On the PAI, veterans with current comorbid MDD scored significantly higher than veterans without MDD ($n = 45$) on the Infrequency validity scale ($F = 10.0$, $p < .01$), the Somatic Complaints ($F = 4.1$, $p < .05$), Anxiety ($F = 7.3$, $p < .01$), and Depression ($F = 15.1$, $p < .001$) clinical scales, and the Suicidal Ideation ($F = 15.1$, $p < .001$) and Stress ($F = 6.1$, $p < .05$) treatment scales, and significantly lower on the Warmth interpersonal scale ($F = 4.8$, $p < .05$).⁹ When the same group differences were examined for the MMPI-2, the MDD group scored significantly higher than the non-MDD group on the F scale ($F = 7.1$, $p < .01$), scale 1 ($F = 4.4$, $p < .05$), scale 2 ($F = 10.7$, $p < .01$), scale 3 ($F = 7.6$, $p < .01$), scale 4 ($F = 8.7$, $p < .01$), scale 6 ($F = 5.1$, $p < .05$), scale 7 ($F = 7.2$, $p < .01$), scale 8 ($F = 7.7$, $p < .01$), and scale 0 ($F = 7.8$, $p < .01$).

Representation of PAI and MMPI-2 Codetypes

To examine the degree of heterogeneity of response profiles, two-point codetypes were identified using the highest clinical scale elevations above 65T for the MMPI-2, and above 70T for the PAI, with the highest two scales defining the two-point codetype. Using this method, a high degree of codetype variability was observed for both instruments. On the PAI, 32 different two-point codetypes were identified in addition to six "spike" profiles (only one scale elevated above 70T). Ten cases showed no significantly elevated clinical scales. On the MMPI-2, 26 different two-point codetypes were identified; there were two "spike" profiles, and one case with no significant elevation.

The modal two-point codetype on the PAI involved the Depression and Somatic Complaints scales, which was also the two-point codetype for the mean profile. However, only 13.1% of the sample had this codetype. In the mean profile, Depression was the highest scale, followed by Somatic Complaints, Anxiety-Related Disorders, and Schizophrenia (see Fig. 1), with the latter three scales differing from one another by less than one T score point. Because of the very small difference between the second, third, and fourth highest scales, the percentage of profiles with a two-point codetype comprised

⁹A reason for the group difference on the Infrequency scale is less apparent, but may have been due to the depressed groups being more careless or less attentive in their responding. Groups did not differ on Negative Impression Management scores.

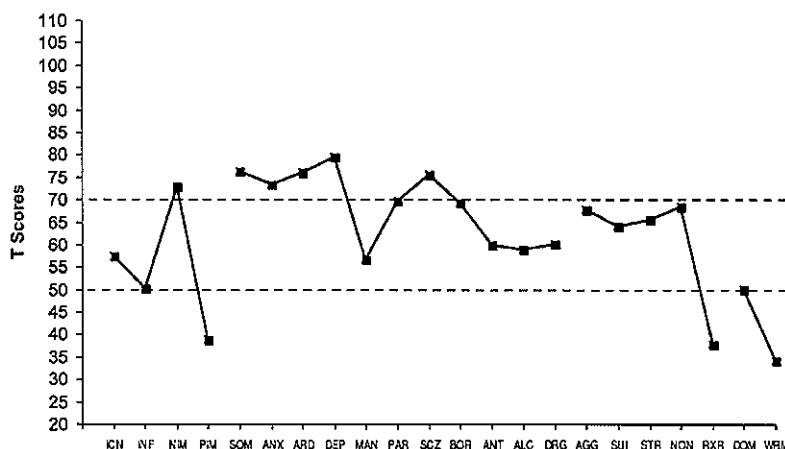


Fig. 1. Mean PAI score profile for veterans diagnosed with PTSD.

of Depression and Somatic Complaints, Depression and Anxiety-Related Disorder, or Depression and Schizophrenia was calculated. Only 28% of cases had one of these codetypes. In other words, even when the codetype of the mean profile was defined in terms of the highest elevated scale combined with *any* of the next three highest elevated scales, only about one-fourth of the sample produced a matching codetype.

The modal two-point codetype on the MMPI-2 was 6-8/8-6, occurring in 22% of the cases. The two-point codetype for the mean profile, however, was 2-8/8-2, but only 8.9% of the profiles actually had this codetype. The complete MMPI-2 mean *T* score profile, in order, was: *L* = 50.4, *F* = 89.8, *K* = 36.1, 1(*Hs*) = 80.1, 2(*D*) = 82.5, 3(*Hy*) = 76.1, 4(*Pd*) = 70.4, 5(*Mf*) = 51.0, 6(*Pa*) = 81.9, 7(*Pt*) = 82.3, 8(*Sc*) = 91.3, 9(*Ma*) = 60.0, and 0(*Si*) = 71.1.

Performance of Validity Scale Cutoffs

Using guidelines provided in the PAI manual, 34 (16.2%) profiles were identified as invalid. A cutoff score of 3 or greater on MAL would have eliminated 28.5% of the PTSD-diagnosed sample in this study. A cutoff raw score of 8 or greater on NIM (*T* score of 73) would have eliminated 52.3% of the sample. Cutoff scores that have been recommended for the Rogers et al. discriminant function were also examined. Based on these cutoffs, 31% of profiles would be indicated as "suspect" (with a score at or above 60*T*), and 14.8% would be designated as "likely to be invalid due to malingering" (at or above 70*T*).

DISCUSSION

The PAI is a multiscale inventory that has demonstrated good psychometric qualities and increasing popularity in the field of clinical psychology, but few prior studies have examined the use of this instrument in PTSD assessment. The primary objective of this study was to characterize the PAI scores of a carefully-diagnosed clinical sample of military veterans with PTSD. The strengths of the dataset on which this study was based were (a) that it was obtained from a large sample of combat veterans (b) PTSD diagnoses were based on structured interviews administered by experienced clinicians with good inter-rater reliability, and (c) it included several established measures of PTSD as well as the MMPI-2.

Special attention was paid to the PAI Traumatic Stress scale, which was designed to assess continuing distress associated with the experience of a traumatic event. Morey (1996) reported that many clinical groups score above 70*T* on this scale, but suggested that patients with PTSD will typically score above 80*T* on this scale, and that elevations above 90*T* would not be uncommon in this population. In this study, over 60% of PTSD-diagnosed individuals scored above 80*T* on this scale, suggesting good sensitivity. Moreover, the Traumatic Stress scale was the highest subscale score, averaging 6.3 *T*-score points above any other subscale score. The Traumatic Stress scale also showed moderate correlations with the Combat Exposure Scale, MMPI-2 PTSD scales, the Mississippi PTSD Scale, and the Davidson Trauma Scale, providing further support for its validity as a measure of PTSD. No information about the correlation of the Traumatic Stress scale with these measures of trauma exposure or PTSD

Table II. Means and Standard Deviations for PAI Clinical Scales and Subscales

Clinical scales	Full scale	Subscales			
Somatic complaints	76.7 (12.8)	Conversion: 78.2 (16.0)	Somatization: 71.0 (11.9)	Health concerns: 71.5 (12.1)	
Anxiety	74.0 (12.6)	Cognitive: 67.9 (12.3)	Affective: 72.6 (12.0)	Physiological: 75.3 (13.9)	
Anxiety-related Disorders	76.3 (12.0)	Obsessive-compulsive: 59.8 (11.3)	Phobias: 61.5 (11.4)	Traumatic stress: 84.0 (13.2)	
Depression	80.6 (12.0)	Cognitive: 72.6 (15.0)	Affective: 77.7 (13.4)	Physiological: 76.3 (8.9)	
Mania	56.9 (11.0)	Activity level: 54.7 (10.8)	Grandiosity: 47.9 (11.2)	Irritability: 63.6 (12.7)	
Paranoia	69.2 (13.7)	Hypervigilance: 67.4 (12.7)	Persecution: 65.5 (15.2)	Resentment: 66.1 (11.6)	
Schizophrenia	76.1 (14.8)	Psychotic experiences: 59.6 (15.6)	Social detachment: 74.0 (14.6)	Thought disorder: 73.2 (14.2)	
Borderline features	69.4 (10.1)	Affective instability: 71.1 (11.5)	Identity problems: 65.6 (9.9)	Negative relationships: 67.2 (11.3)	Self-harm: 56.4 (12.1)
Antisocial features	59.6 (10.3)	Antisocial behaviors: 59.6 (9.9)	Egocentricity: 56.6 (11.9)	Stimulus-seeking: 56.7 (11.5)	
Alcohol Problems	59.4 (17.1)				
Drug Problems	59.1 (13.8)				

Table III. Means and Standard Deviations for PAI Validity, Treatment, and Interpersonal Scales

	Mean	Standard deviation
<i>Validity scales</i>		
Inconsistency	57.3	7.9
Infrequency	50.7	8.5
Negative impression management	72.5	15.9
Positive impression management	38.5	11.1
<i>Treatment scales</i>		
Aggression full scale	67.0	13.4
Aggressive attitude:	65.1	12.1
Verbal aggression:	56.9	10.7
Physical aggression:	71.6	17.1
Suicidal Ideation	65.2	19.3
Stress	65.9	12.6
Nonsupport	68.5	12.8
Treatment rejection	38.0	9.0
<i>Interpersonal scales</i>		
Dominance	50.1	10.3
Warmth	34.3	13.2

is available in the literature to compare with the present findings.¹⁰

Although these findings provide additional evidence for the convergent validity of the PAI Traumatic Stress scale, it should be noted that its construct validity is limited by virtue of the fact that it does not measure the full spectrum of DSM-IV PTSD symptoms. The eight items of the Traumatic Stress scale assess distress associated with reexperiencing of a past stressful event, feelings that life is worse than before a past stressful event, and some numbing and avoidance symptoms. However, no items directly assess hyperarousal or hypervigilance, (though, as noted by Morey (1996) these types of symptoms can be partially assessed with the PAI Irritability subscale of the Mania scale and the Hypervigilance subscale of the Paranoia scale). In addition, the face-validity of the traumatic stress scale items may limit its usefulness with compensation-seeking individuals or in other forensic contexts. Due to these limitations, it is recommended that the PAI Traumatic Stress scale be used as a supplementary, rather than primary, measure of PTSD. It is also recommended that future studies examine the discriminant validity of the PAI Traumatic Stress scale.

As observed earlier, a noteworthy feature of the PAI is that it permits examination of diagnostic complications inherent to the assessment and treatment of PTSD, in-

cluding the high rates of psychiatric comorbidity and a diverse, complex array of associated clinical features. In relation to this, examination of the mean PAI profile revealed significant elevations on clinical scales measuring somatic complaints, anxiety, anxiety disorders, depression, and schizophrenia. Analysis of the schizophrenia subscale scores suggested that problems in the areas of social detachment and thought disorder, rather than psychotic experiences, accounted for the significant elevation on the full scale. This observation is consistent with prior research suggesting that 30–40% of combat veterans with PTSD endorse symptoms associated with psychotic disorders in the absence of an actual psychotic disorder diagnosis (Lindley, Carlson, & Sheikh, 2000).

The findings of this study were consistent with an extensive literature documenting high rates of comorbid depression (Brady, 1997; Helzer, Robin, & McEvoy, 1987; Keane & Wolfe, 1990; Kessler et al., 1995), somatic complaints, and health problems (Friedman & Schnurr, 1995; McFarlane, Atchison, Rafalowicz, & Papay, 1994; Solomon, 1988; Solomon, Mikulincer, & Kotler, 1987) in individuals with PTSD. When individuals meeting criteria for current Major Depression were compared to those who did not, the groups were differentiated on PAI scales assessing depression, anxiety, somatic complaints, suicidal ideation, and stress. These results suggest that these PAI scales have some unique association with the presence of depression and support the utility of the PAI for distinguishing cases with and without comorbid depression. Differences between groups on the Depression and Suicidal Ideation scales are consistent with Morey's emphasis (Morey, 1996) on the role of these scales in MDD diagnosis. However, the lack of group difference on the PAI Mania scale suggests that this scale may not be useful in MDD evaluation when it is comorbid with PTSD.

Problems in the domain of emotional hyperreactivity and impulsive anger that are common in military veterans with PTSD (e.g., intense anxiety in response to trauma-related cues or sudden outbursts of anger) were reflected in elevated scores on the Affective Instability and Physical Aggression subscales. Other affective difficulties related to anxiety and depression were indexed by elevations on Affective Depression, Affective Anxiety, and the Physiological Anxiety subscales. Collectively, these findings highlight the potential utility of the PAI for assessing the multiple domains of psychopathology and comorbidity that are relevant to the presentation of veterans with chronic and severe PTSD that fall outside of the relatively narrow PTSD construct defined by the DSM.

Examination of mean score profiles and comparisons of mean scale scores between groups provides useful

¹⁰For the Anxiety-Related Disorders full scale, Morey has reported a higher correlation with the Mississippi Scale ($r = .81$; Morey, 1996) than was found in the present study.

information about the overall performance of the sample on the PAI, but cannot provide information about individual variations in score patterns. Given the high degree of heterogeneity that has been documented for PTSD samples on the MMPI-2, the variability in responses was assessed by examining PAI and MMPI-2 two-point codetypes. Codetypes represent a common method of clinical interpretation for multiscale measures of psychopathology, but no prior study has examined the PAI codetypes of individuals with PTSD. Analyses revealed that, as with the MMPI-2, the most common PAI codetypes involved scales designed to assess somatic complaints, anxiety, depression, and schizophrenia. Importantly, results showed no indication of a clear "PTSD codetype" on either measure. On the PAI, the two-point codetype for the mean profile and the codetype for the modal profile were the same (Depression and Somatic Complaints), but this codetype was represented in only 11% of profiles. The results of the present study call into question the utility of designating any particular PAI codetype as "prototypic" of PTSD and support previous work suggesting that reporting mean profiles alone obscures the actual variability in multiscale inventory profiles of individuals with PTSD (Glenn et al., 2002; Munley et al., 1993, 1995; Wise, 1996).

To address the issue of response validity, the proportion of PAI profiles identified as invalid using different recommended validity cutoffs was examined. The sample mean profile showed a significant elevation on the Negative Impression Management scale with no significant elevations on any of the other three validity scales (Infrequency, Inconsistency, or Positive Impression Management). When scale scores were examined for the entire sample prior to elimination of any profiles, recommended cutoffs (Calhoun et al., 2000; Liljequist et al., 1998) for the Malingering Index and the Negative Impression Management Scale would have identified 26.6% and 57.8% of the sample, respectively, as likely to have invalid PAI scores. When lower recommended cutoffs for MAL and NIM were examined, results were similar to those reported by Calhoun et al. (2000). The recommended cutoff score for the Rogers et al. (1996) malingering discriminant function would have identified 27.2% of the present sample. For the purposes of the present study, the highest recommended cutoffs for the Infrequency, Inconsistency, NIM, and MAL scales in the PAI interpretive manual (Morey, 1996) were used, resulting in the elimination of 16.2% of cases. These findings suggest that additional research is needed to establish optimal cutoffs for PAI validity scales in compensation-seeking PTSD samples. Until such work is completed, clinicians are urged to be cautious in interpretation of elevated validity indices and

to weigh carefully the influence of actual psychopathology against suspected overreporting.

These findings underscore problems inherent to the use of validity indices to evaluate the response bias of compensation-seeking military veterans. Prior research has shown that compensation-seeking veterans report significantly more distress across many domains of psychopathology on self-report measures than veterans who are non-compensation-seeking (Frueh et al., 2003; Frueh, Gold, & de Arellano, 1997; Gold & Frueh, 1999), though they do not necessarily differ in interview-based PTSD diagnosis (Frueh et al., 2003; Frueh, Smith, & Barker, 1996). Indeed, in the present study a highly elevated mean profile and high elevations on scales designed to measure negative impression management and malingering were found. One explanation for these observed elevations is that these veterans are malingering. However, most researchers in the area of PTSD assessment agree that it is unlikely that the high proportion of veterans who score above traditional validity scale cutoffs are all malingering, particularly when interview and collateral information corroborates their reported symptoms (Frueh et al., 2003; Hyer, Fallon, Harrison, & Boudewyns, 1987; Resnick, 1997). Instead, higher cutoffs or alternative versions of validity scales are often recommended for the assessment of PTSD (Elhai, Ruggiero, Frueh, Beckham, & Gold, 2002; Guriel & Fremouw, 2003). Assuming that malingering is not an adequate explanation, the high rates of symptom endorsement by some veterans may reflect truly elevated rates of comorbid psychiatric difficulties in this population. Evidence for this explanation has been mixed depending on the validity indices used to identify exaggeration (Gold & Frueh, 1999; Smith & Frueh, 1996). A third possibility worthy of future study is that many veterans with chronic, combat-related PTSD suffer from a complex form of PTSD (Herman, 1992) characterized by severe personality disturbance, and that the high rates of symptom endorsement and inconsistent responding reflects accompanying identity disturbance.

Ideally, response validity could have been better addressed by including a non-compensation-seeking group for comparison. However, the study is limited by reliance on a VA clinic convenience sample, which did not include a sufficient number of non-compensation-seeking or non-PTSD veterans to provide comparison groups. Without a non-PTSD or other psychiatric comparison group the present study also cannot adequately address the discriminant validity of the PAI with regards to PTSD diagnosis. In addition, generalizability of findings to women or individuals with PTSD related to noncombat trauma is limited because only male veterans with combat-related PTSD are

included in the sample. A final limitation is the lack of CAPS total scores for the full sample, which would have allowed examination of associations between PAI scales and CAPS scores, both for the total CAPS score and for separate symptom cluster scores.

Because knowledge regarding the use of the PAI in PTSD evaluation is in its early stages, data of this sort are important for building a research base for the PAI even with the limitations of the sample examined here. Results of the present study indicate that the Traumatic Stress scale shows promise in terms of convergent validity with other measures of PTSD and that the PAI may be useful for detection of comorbid depression in veterans with PTSD. In addition, they provide further evidence calling into question the value of trying to identify and interpret specific PTSD profile codetypes. The PAI, like the MMPI-2, provides information about a broad range of functioning and allows clinicians to examine psychopathology from a multidimensional perspective. This feature is important in light of the high rate of comorbidity in PTSD samples and growing evidence supporting the existence of identifiable PTSD subtypes (Miller, Greif, & Smith, 2003). With multiple scales linked to a variety of diagnostic categorizations, multiscale inventories can play an important role in the identification of particular subtype patterns of psychopathology as well as differential diagnosis and a variety of cooccurring problematic behaviors. The consensus of clinicians and investigators is to recommend a multimethod approach to PTSD assessment, including the use of multiscale inventories (cf. Malloy, Fairbank, & Keane, 1983). The current findings provide a foundation against which future work with the PAI in PTSD samples can be compared and add to the larger effort of examining the utility of multiscale inventories in PTSD assessment.

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